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PROGRESS REPORT

BADGER WASH COOPERATIVE STUDY  
PRECIPITATION, RUNOFF, AND SEDIMENT YIELD, 1967 SEASON

by

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## U.S. GEOLOGICAL SURVEY

## PROGRESS REPORT

## BADGER WASH COOPERATIVE STUDY

## PRECIPITATION, RUNOFF, AND SEDIMENT YIELD, 1967 SEASON

By Gregg C. Lusby

Shown in the following tables are data on precipitation, runoff, and sediment yield obtained at the Badger Wash study area during 1967. A complete description of the study area and instrumentation installed may be obtained from USGS Water-Supply Paper 1532-B.

Precipitation amounts are shown in table 1. Average precipitation for the summer season as measured in 12 rain gages was 6.68 inches, or 46 percent more than the average for the previous 13 years. Considerable variation in rainfall from place to place occurred during the summer.

The largest runoff event of the year took place on August 9 at the lower end of the Badger Wash basin, but the upper end of the basin where the paired watersheds are located had practically none. As a consequence of the variation in rainfall, runoff in natural watersheds ranged from a low of 8 acre-feet per square mile to a high of 88 acre-feet per square mile. Sediment yield was also extremely spotty, ranging from a low of .36 acre-feet per square mile to 6.7 acre-feet per square mile.

The furrowed area in drainage basin 16 produced 22 percent of the water and 3 percent of the sediment produced in the unfurrowed adjacent area.

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Date		ershed number				
		2B	3A	3B	4A	4B
Mar.	29	0.01	0.01	0.01	0	0
Apr.	4	.01	0	0	.01	.01
	23	0	.02	.02	0	0
	25	.07	.08	.08	.07	.07
May	5	.17	.19	.20	.20	.21
	6	.03	.02	.02	.04	.05
	25	.05	.05	.05	.05	.06
	26	1.62	1.34	1.35	1.41	1.41
	27	0	0	0	.01	.01
	28	.07	.07	.07	.08	.08
	29	.07	.08	.08	.08	.09
	30	.03	.02	.02	.07	.08
	31	.02	0	.01	0	0
June	4	.10	.19	.19	.10	.10
	5	.06	.08	.07	.07	.08
	12	.05	.04	.05	.05	.06
	13	.31	.39	.41	.33	.32
	14	.03	.13	.12	.12	.12
	15	0	0	0	.04	.05
	19	.03	.03	.03	.05	.05
	20	.12	.20	.20	.17	.18
July	4	.02	.05	.05	0	0
	7	.59	.69	.72	.50	.50
	14	.09	.49	.44	.05	.05
	15	.04	.03	.03	.04	.04
	16	.02	.02	.02	.02	.02
	17	.76	.50	.55	.73	.74
	24	0	0	0	.01	.01
Aug.	6	.01	0	0	0	0
	7	.62	.67	.69	.57	.57
	9	.15	.12	.12	.08	.07
	31	.22	.17	.18	.16	.16
Sept.	7	0	.06	.06	0	0
	8	.42	.48	.49	.46	.46
	10	0	0	0	0	0
	11	.11	.15	.16	.10	.10
	18	.02	.05	.05	.02	.02
	19	0	0	0	0	0
	24	.02	.02	.01	0	0
Oct.	4	.03	.02	.02	.05	.05
	5	.10	.09	.10	.06	.06
	6	.20	.11	.12	.10	.10
Total						
Mar.28-Oct.28,1967		6.27	6.66	6.79	5.90	5.98
Nov.4,1966 to						
Oct.28, 1967		--	--	--	--	--





Table 1.--Precipitation, Badger Wash (March 28 to October 29, 1967)

[When numbers are shown in parentheses, no daily record obtained. Amounts estimated from total catch or other records.]

Date		Amount (inches)																			
		Gage number												Watershed number							
		1	2	3	3A	4	5	6	7	7A	8	9	11	1A	1B	2A	2B	3A	3B	4A	4B
Mar.	29	0.02	0.01	0.01	0.01	(0.01)	0.01	0.01	0	0.02	0	0.01	(0.01)	0.02	0.02	0.01	0.01	0.01	0	0	
Apr.	4	.01	.02	.01	.02	(.01)	0	0	.01	.01	(0 )	0	0	.01	.01	.01	.01	0	0	.01	.01
	23	.02	.01	0	0	0	.02	.02	0	(0 )	0	.01	(0 )	.02	.02	0	0	.02	.02	0	0
	25	.07	.07	.07	.06	.10	.08	.07	(.07)	.02	(.07)	.05	(.05)	.07	.07	.08	.07	.08	.08	.07	.07
May	5	.22	.16	.17	.23	(.20)	.19	.21	.21	.23	.20	.18	.20	.22	.20	.18	.17	.19	.20	.20	.21
	6	.02	.03	.03	(.03)	(.03)	.02	.03	.02	.02	.10	.01	(.02)	.02	.02	.03	.03	.02	.02	.04	.05
	25	.08	.05	.05	.08	.10	.05	.05	.03	.07	.10	.03	(.04)	.08	.07	.07	.05	.05	.05	.05	.06
	26	1.40	1.38	1.62	1.84	1.50	1.34	1.40	1.42	1.48	1.40	1.40	(1.50)	1.40	1.39	1.58	1.62	1.34	1.35	1.41	1.41
	27	.01	0	0	0	0	0	.01	.02	.02	0	0	0	.01	.01	0	0	0	0	.01	.01
	28	.09	.06	.07	(.15)	.10	.07	.06	.07	.10	.10	.08	(.06)	.09	.08	.08	.07	.07	.07	.08	.08
	29	.11	.11	.07	(.15)	.10	.08	.09	.08	.09	.10	.07	(.10)	.11	.11	.08	.07	.08	.08	.08	.09
	30	.05	.01	.03	(.05)	.10	.02	.03	.07	.09	.10	.05	(.05)	.05	.03	.05	.03	.02	.02	.07	.08
	31	.02	.01	.02	(.05)	(.02)	0	.02	0	.03	0	0	(0 )	.02	.02	.02	.02	0	.01	0	0
June	4	.19	.14	.10	(.20)	.10	.19	.18	.10	.13	.10	.10	(.10)	.19	.17	.10	.10	.19	.19	.10	.10
	5	.07	.10	.06	(.10)	.10	.08	.05	.06	.12	.10	.06	(.05)	.07	.08	.07	.06	.08	.07	.07	.08
	12	.06	.08	.05	.09	.10	.04	.06	.04	.07	.10	.03	(.05)	.06	.07	.07	.05	.04	.05	.05	.06
	13	.38	.42	.31	.30	.40	.39	.48	.34	.37	.30	.33	.50	.38	.40	.34	.31	.39	.41	.33	.32
	14	.06	.10	.03	.06	.10	.13	.09	.14	.17	.10	.09	.30	.06	.08	.06	.03	.13	.12	.12	.12
	15	0	0	0	0	0	0	0	.02	.03	.10	(.05)	0	0	0	0	0	0	0	.04	.05
	19	.04	.05	.03	.08	(.04)	.03	.04	(.05)	.06	(.05)	.05	(.07)	.04	.04	.03	.03	.03	.03	.05	.05
	20	.14	.23	.12	.14	.20	.20	.21	.17	.18	.20	.15	.20	.14	.23	.15	.12	.20	.20	.17	.18
July	4	.07	.05	.02	.01	(.02)	.05	.04	0	.02	0	0	0	.07	.06	.02	.02	.05	.05	0	0
	7	.60	.80	.59	.51	(.50)	.69	.80	.50	.54	.50	.50	.60	.60	.70	.56	.59	.69	.72	.50	.50
	14	.50	.42	.09	.13	(.10)	.49	.30	.05	.10	(.05)	.06	0	.50	.46	.09	.09	.49	.44	.05	.05
	15	.03	.04	.04	.06	(.04)	.03	.04	.04	.03	.05	.04	(.05)	.03	.03	.04	.04	.03	.03	.04	.04
	16	.03	.03	.02	.05	(.03)	.02	.03	.02	.05	(.03)	.02	.10	.03	.03	.02	.02	.02	.02	.02	.02
	17	.49	.57	.76	.73	(.60)	.50	.69	.72	.80	.77	.69	.60	.49	.53	.71	.76	.50	.55	.73	.74
	24	0	0	0	.04	0	0	0	.01	.03	0	0	0	0	0	0	0	0	0	.01	.01
Aug.	6	0	0	.01	.02	0	0	0	0	.02	0	0	0	0	0	.01	.01	0	0	0	0
	7	.65	.73	.62	.59	.60	.67	.76	.55	.64	.60	.62	.60	.65	.69	.61	.62	.67	.69	.57	.57
	9	.17	.18	.15	.21	.60	.12	.13	.05	.12	.10	.14	1.10	.17	.17	.29	.15	.12	.12	.08	.07
	31	.18	.17	.22	.29	.20	.17	.20	.14	.21	.20	.17	.20	.18	.18	.21	.22	.17	.18	.16	.16
Sept.	7	0	.02	0	0	0	.06	.05	0	.02	0	0	0	0	.01	0	0	.06	.06	0	0
	8	.48	.50	.42	.61	.50	.48	.50	.43	.50	.50	.48	.60	.48	.49	.44	.42	.48	.49	.46	.46
	10	0	0	0	.02	0	0	0	0	.01	0	0	0	0	0	0	0	0	0	0	0
	11	.09	.16	.11	.12	.10	.15	.18	.10	.12	.10	.08	.10	.09	.12	.11	.11	.15	.16	.10	.10
	18	.02	.04	.02	.02	(.02)	.05	.04	.02	.01	(.02)	(.02)	(.03)	.02	.03	.02	.02	.05	.05	.02	.02
	19	0	0	0	.03	0	0	0	0	.04	0	0	0	0	0	0	0	0	0	0	0
	24	0	0	.02	.02	(.02)	.02	(0 )	0	.01	0	0	(.02)	0	0	.02	.02	.02	.01	0	0
Oct.	4	.02	.02	.03	.03	(.03)	.02	.03	.05	.05	(.05)	.03	.10	.02	.02	.03	.03	.02	.02	.05	.05
	5	.10	.08	.10	.10	.10	.09	.11	.06	.10	.05	.10	.10	.10	.09	.10	.10	.09	.10	.06	.06
	6	.09	.10	.20	.15	.10	.11	.14	.10	.11	.10	.10	.10	.09	.09	.17	.20	.11	.12	.10	.10
Total																					
Mar.28-Oct.28,1967		6.58	6.99	6.27	7.38	6.87	6.66	7.15	5.76	6.84	6.33	5.80	7.60	6.58	6.82	6.46	6.27	6.66	6.79	5.90	5.98
Nov.4,1966 to Oct.28, 1967		11.43	11.72	10.59	--	--	11.39	12.03	10.23	--	--	10.20	--	--	--	--	--	--	--	--	--







Table 2.--Runoff at Badger Wash, 1967

Drainage basin	Drainage area (sq mi)	Runoff		Sediment	
		Acre-ft	Acre-ft per sq mile	Acre-ft	Acre-ft per sq mile
1-A	0.066	1.26	19.1	0.16	2.42
1-B	.084	2.36	28.0	.17	2.02
2-A	.148 <u>1</u> /	7.23	48.8	.58	3.92
2-B	.158	5.05	32.0	.37	2.34
3-A	.059	3.05	51.7	.20	3.39
3-B	.048	3.26	68.0	.27	5.62
4-A	.022	.82	37.2	.11	5.00
4-B	.019	.42	22.1	.08	4.21
5	.055	1.16	21.1	.02	.36
6	.220	3.37	15.3	.45	2.05
7	.094	2.38	25.3	.30	3.19
8	.109	2.45	22.5	.32	2.94
9	.313	23.33	74.5	2.10	6.71
10	.100	.78	7.80	.17	1.70
11	.089	6.45	72.5	.28	3.15
12	.092	8.09	87.9	.13	1.41
13	.484	40.6	83.9	2.86	5.91
14	1.53	80.6	52.7	2.82	1.84
15	.136 <u>2</u> /	3.83	28.2	.16	1.18
16	.239 <u>2</u> /	1.45	6.07	.01	.04

1/ Excluding runoff from auxiliary watershed.

2/ Drainage area approximate. To be computed at a later date.





Table 3.--Runoff, Badger Wash  
Observation Reservoir 1A

Location.--Lat 39°20', long 108°56', in sec. 24, T. 8 S., R. 104 W.,  
near Mack, Mesa Co., Colo.

Drainage area.--0.066 sq mi (42 acres).

Records available.--April 1954 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of gage 5,058.08 ft above mean  
sea level.

Runoff and discharge determination.--Contents of reservoir and volume  
of inflow computed from a stage-capacity curve of the reservoir.

Capacities.--At spillway level (gage-ht of 54.7 ft):

December 1953 - 8.10 acre-ft  
July 1955, November 1956 - 7.39 acre-ft  
October 1957, November 1958 - 7.15 acre-ft  
November 1959 - 6.86 acre-ft  
November 1961 - 6.50 acre-ft  
November 1962 - 6.42 acre-ft  
November 1963 - 6.37 acre-ft  
November 1964 - 6.33 acre-ft  
November 1965 - 5.88 acre-ft  
November 1966 - 5.88 acre-ft  
November 1967 - 5.72 acre-ft

Maxima.--Maximum storm inflow 3.27 acre-ft, 49.5 acre-ft per sq mile,  
July 25, 1955.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Inflow		
		Acre-ft	Acre-ft per sq mile	inches
June 13	0.38	0.01	0.15	0.003
July 7	.60	.08	1.21	.023
July 14	.50	.27	4.09	.077
July 17	.49	.51	7.73	.145
Aug. 7	.65	.09	1.36	.026
Aug. 9	.17	.01	.15	.003
Sept. 8	.48	.29	4.39	.082
Total		1.26	19.08	.359





Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 1B

Location.--Lat 39°20', long 108°56', in sec. 25, T. 8 S., R. 104 W., near Mack, Mesa Co., Colo.

Drainage area.--0.084 sq mi (54 acres).

Records available.--April 1954 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of gage is 5,023.92 ft above mean sea level.

Runoff and discharge determinations.--Contents of reservoir and volume of inflow computed from a stage-capacity curve of the reservoir.

Capacities.--At spillway level (gage-ht of 19.5 ft):

December 1953 - 19.8 acre-ft

July 1955, November 1956 - 19.2 acre-ft

October 1957, November 1958, November 1959 - 19.1 acre-ft

November 1961 - 18.7 acre-ft

November 1962 - 18.6 acre-ft

November 1963 - 18.5 acre-ft

November 1964 - 18.5 acre-ft

November 1965 - 18.2 acre-ft

November 1966 - 18.2 acre-ft

November 1967 - 18.0 acre-ft

Maxima.--Maximum storm inflow volume 3.30 acre-ft, 39.3 acre-ft per sq mile, July 25, 1955.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Inflow		
		Acre-ft	Acre-ft per sq mile	Inches
May 26	1.39	0.15	1.79	0.034
June 13	.40	.07	.83	.016
July 7	.70	.52	6.19	.116
July 14	.46	.09	1.07	.020
July 17	.53	.68	8.10	.152
Aug. 7	.69	.29	3.45	.065
Aug. 9	.17	.07	.83	.016
Sept. 8	.49	.44	5.24	.098
Sept. 11	.12	.03	.36	.007
Total	--	2.34	27.86	.524





Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 2A

Location.--Lat 39°20', long 103°57', in sec. 36, T. 8 S., R. 104 W., near Mack, Mesa Co., Colo.

Drainage area.--0.148 sq mi (95 acres).

Records available.--April 1966 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of gage is 4,946.43 ft above mean sea level. Reservoir of side drainage in same watershed equipped with reference mark, crest stages noted. Elevation of reference mark is 4,940 ft (from topographic map).

Runoff and discharge determinations.--Contents of reservoirs and volume of inflow computed from a stage capacity curve of the reservoir.

Capacities.--At spillway level.

<u>Main reservoir</u>		<u>Auxiliary reservoir</u>	
Dec. 1953 - 6.34 acre-ft		Dec. 1953 - 6.14 acre-ft	
July 1955, Nov. 1956 - 4.42 acre-ft		July 1955, Nov. 1956, Oct. 1957,	
Oct. 1957, Nov. 1958 - 3.93 acre-ft		Nov. 1958 - 5.71 acre-ft	
Nov. 1959 - 3.72 acre-ft		Nov. 1959 - 5.61 acre-ft	
Dam raised Nov. 1959		July 1962 - 5.55 acre-ft	
Nov. 1959 - 15.08 acre-ft		Nov. 1963 - 5.49 acre-ft	
Nov. 1961 - 13.86 acre-ft		Nov. 1964 - 5.31 acre-ft	
Nov. 1962 - 13.70 acre-ft		Nov. 1965 - 5.18 acre-ft	
Nov. 1963 - 13.53 acre-ft		Nov. 1966 - 5.18 acre-ft	
Nov. 1964 - 12.40 acre-ft		Nov. 1967 - 5.24 acre-ft	
Nov. 1965 - 12.07 acre-ft			
Nov. 1966 - 12.07 acre-ft			
Nov. 1967 - 11.49 acre-ft			

Maxima.--Maximum storm inflow volume 7.71 acre-ft, 46.2 acre-ft per sq mile, July 25, 1955. Inflow lasted 50 minutes.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Inflow		
		Acre-ft	Acre-ft per sq mile	Inches
May 26	1.58	1.77	12.0	0.225
June 13	.34	.19	1.28	.024
July 7	.56	.61	4.12	.077
July 17	.71	2.00	13.5	.253
Aug. 7	.61	.43	2.95	.055
Aug. 9	.29	.54	3.65	.068
Sept. 8	.44	1.26	8.51	.160
Oct. 6	.17	.41	2.77	.052
Total	--	7.21	48.78	.914





Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 2B

Location.--Lat 39°20', long 108°57', in sec. 25, T. 8 S., R. 104 W., near Mack, Mesa Co., Colo.

Drainage area.--0.158 sq mi (101 acres).

Records available.--April 1954 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of gage is 4,970 ft above mean sea level.

Runoff and discharge determinations.--Contents of reservoir and volume of inflow computed from a stage capacity curve of the reservoir.

Capacities.--At spillway level.

December 1953 - 8.45 acre-ft

July 1955, November 1956, October 1957, November 1958 - 6.05 acre-ft  
Dam raised

June 1959 - 24.8 acre-ft

November 1959 - 24.5 acre-ft

November 1961 - 23.8 acre-ft

November 1962 - 23.6 acre-ft

November 1963 - 23.5 acre-ft

November 1964 - 23.0 acre-ft

November 1965 - 22.7 acre-ft

November 1966 - 22.7 acre-ft

November 1967 - 22.3 acre-ft

Maxima.--Maximum storm inflow volume 6.29 acre-ft, 39.8 acre-ft per sq mile, July 25, 1955. Inflow lasted 90 minutes.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Acre-ft	Inflow	
			Acre-ft per Sq mile	Inches
May 26	1.62	.68	4.30	0.081
June 13	.31	.12	.76	.014
July 7	.59	.86	5.44	.102
July 17	.76	1.65	10.4	.195
Aug. 7	.62	.36	2.28	.043
Aug. 9	.15	.04	.25	.005
Sept. 8	.42	1.01	6.39	.120
Sept. 11	.11	.04	.25	.005
Oct. 6	.20	.28	1.77	.033
Total	--	5.04	31.84	.598





Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 3A

Location.--Lat 39°20', long 108°56', in sec. 25, T. 8 S., R. 104 W., near Mack, Mesa Co., Colo.

Drainage area.--0.059 sq mi (38 acres).

Records available.--April 1954 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of gage 5,033.68 ft above mean sea level.

Runoff and discharge computations.--Contents of reservoir and volume of inflow computed from a stage capacity curve of the reservoir.

Capacities.--At spillway level.

December 1956 - 12.90 acre-ft  
July 1955, November 1956 - 12.63 acre-ft  
October 1957, November 1958 - 12.53 acre-ft  
November 1959 - 12.32 acre-ft  
November 1961 - 12.12 acre-ft  
November 1962 - 12.03 acre-ft  
November 1963 - 12.00 acre-ft  
November 1964 - 11.97 acre-ft  
November 1965 - 11.53 acre-ft  
November 1966 - 11.53 acre-ft  
November 1967 - 11.33 acre-ft

Maxima.--Maximum storm inflow volume 2.98 acre-ft, 50.5 acre-ft per sq mile, July 25, 1955.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Acre-ft	Inflow	Inches
			Acre-ft per sq mile	
May 26	1.34	.23	3.90	0.073
June 4	.19	.02	.34	.006
June 13	.39	.13	2.20	.041
June 14	.13	.04	.68	.013
June 20	.20	.03	.51	.010
July 7	.69	.42	7.12	.134
July 14	.49	.61	10.3	.193
July 17	.50	.59	10.0	.188
Aug. 7	.67	.37	6.27	.118
Sept. 8	.48	.57	9.66	.181
Oct. 6	.11	.04	.68	.017
Total	--	3.05	51.66	.974

Location: 10° 20' N, 105° 10' E, in area 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

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Name: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Description: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Remarks: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Summary: 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100.

Date	Frequency	Amplitude	Phase	Remarks
May 15	1.50	1.1	1.0	1.0
June 1	1.50	1.1	1.0	1.0
June 15	1.50	1.1	1.0	1.0
June 30	1.50	1.1	1.0	1.0
July 15	1.50	1.1	1.0	1.0
July 30	1.50	1.1	1.0	1.0
Aug 15	1.50	1.1	1.0	1.0
Aug 30	1.50	1.1	1.0	1.0
Sept 15	1.50	1.1	1.0	1.0
Sept 30	1.50	1.1	1.0	1.0
Oct 15	1.50	1.1	1.0	1.0
Oct 30	1.50	1.1	1.0	1.0
Nov 15	1.50	1.1	1.0	1.0
Nov 30	1.50	1.1	1.0	1.0
Dec 15	1.50	1.1	1.0	1.0
Dec 30	1.50	1.1	1.0	1.0
Total	1.50	1.1	1.0	1.0



Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 3B

Location.--Lat 39°20', long 108°56', in sec. 25, T. 8 S., R. 104 W., near Mack, Mesa Co., Colo.

Drainage area.--0.048 sq mi (31 acres).

Records available.--April 1954 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of gage is 5,013.80 ft above mean sea level.

Runoff and discharge determinations.--Contents of reservoir and volume of inflow computed from a stage capacity curve of the reservoir.

Capacities.--At spillway level.

December 1953 - 8.10 acre-ft

July 1955, November 1956 - 7.69 acre-ft

October 1957, November 1958 - 7.65 acre-ft

November 1959 - 7.52 acre-ft

November 1961 - 7.38 acre-ft

November 1962 - 7.16 acre-ft

November 1963 - 6.99 acre-ft

November 1964 - 6.97 acre-ft

November 1965 - 6.74 acre-ft

November 1966 - 6.74 acre-ft

November 1967 - 6.47 acre-ft

Maxima.--Maximum storm runoff volume 2.35 acre-ft, 49.6 acre-ft per sq mile, July 25, 1955.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Acre-ft	Inflow	
			Acre-ft per sq mile	Inches
May 26	1.35	0.48	10.0	0.188
June 4	.19	.01	.21	.004
June 13	.41	.13	2.71	.051
June 14	.12	.04	.83	.016
July 7	.72	.59	12.3	.231
July 14	.44	.26	5.42	.102
July 17	.55	.79	16.5	.309
Aug. 7	.69	.35	7.29	.137
Sept. 8	.49	.46	9.58	.180
Sept. 11	.16	.08	1.67	.031
Oct. 6	.12	.07	1.46	.027
Total	--	3.26	67.97	1.276

# Table 2. - *Estimated 1961-62* *Operating Expenses*

Estimated - for 1961-62, based on 1960-61 actuals, as reported by the Bureau of Reclamation, Washington, D.C.

Estimated - for 1961-62, based on 1960-61 actuals

Estimated - for 1961-62, based on 1960-61 actuals, as reported by the Bureau of Reclamation, Washington, D.C.

Estimated - for 1961-62, based on 1960-61 actuals, as reported by the Bureau of Reclamation, Washington, D.C.

Estimated - for 1961-62, based on 1960-61 actuals, as reported by the Bureau of Reclamation, Washington, D.C.

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Estimated - for 1961-62, based on 1960-61 actuals

Estimated - for 1961-62, based on 1960-61 actuals

Estimated - for 1961-62, based on 1960-61 actuals, as reported by the Bureau of Reclamation, Washington, D.C.

Estimated - for 1961-62, based on 1960-61 actuals

Estimated - for 1961-62, based on 1960-61 actuals

Estimated - for 1961-62, based on 1960-61 actuals, as reported by the Bureau of Reclamation, Washington, D.C.

Item	Estimated 1961-62	Estimated 1960-61	Percent Change
Salaries	1.15	1.00	15.0
Benefits	.30	.25	20.0
Travel	.01	.01	0.0
Telephone	.01	.01	0.0
Postage	.01	.01	0.0
Printing	.01	.01	0.0
Supplies	.01	.01	0.0
Repairs	.01	.01	0.0
Insurance	.01	.01	0.0
Utilities	.01	.01	0.0
Depreciation	.01	.01	0.0
Other	.01	.01	0.0
Total	1.54	1.34	14.9



Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 4A

Location.--Lat 39°19', long 108°56', sec. 36, T. 8 S., R. 104 W.,  
near Mack, Mesa Co., Colo.

Drainage area.--0.022 sq mi (14 acres).

Records available.--April 1954 to November 1967, summer months only.

Gage.--Water-stage recorder. Elevation of reference mark is 4,944.83  
ft above mean sea level.

Runoff and discharge determinations.--Contents of reservoir and volume  
of inflow computed from a stage-capacity curve of the reservoir.

Capacities.--At spillway level.

December 1953 - 3.05 acre-ft

July 1955, November 1956 - 2.60 acre-ft

October 1957, November 1958 - 2.39 acre-ft

November 1959 - 2.33 acre-ft

November 1961, November 1962 - 2.10 acre-ft

November 1963 - 2.05 acre-ft

November 1964 - 1.90 acre-ft

November 1965 - 1.72 acre-ft

November 1966 - 1.72 acre-ft

November 1967 - 1.61 acre-ft

Maxima.--Maximum storm inflow volume, 1.20 acre-ft, 54.5 acre-ft per  
sq mi, July 25, 1955. Inflow lasted 45 minutes.

Remarks.--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Inflow		
		Acre-ft	Acre-ft per sq mile	Inches
May 26	1.41	0.12	5.45	0.102
June 13	.33	.04	1.82	.034
June 14	.12	.03	1.36	.026
July 7	.50	.05	2.27	.043
July 17	.73	.33	15.0	.281
Sept. 8	.46	.24	10.9	.204
Sept. 11	.10	.01	.45	.008
Total	--	.82	37.25	.698





Table 3.--Runoff, Badger Wash--Continued  
Observation Reservoir 4B

Location--Lat 39°19', long 108°56', in sec. 36, T. 8 S., R. 104 W., near Mack, Mesa Co., Colo.

Drainage area--0.019 sq mi (12 acres).

Records available--April 1954 to November 1967, summer months only.

Gage--Water-stage recorder. Elevation of reference mark is 4,969.96 ft above mean sea level.

Runoff and discharge determinations--Contents of reservoir and volume of inflow computed from a stage-capacity curve of the reservoir.

Capacities--At spillway level.

December 1953 - 4.52 acre-ft  
July 1955, November 1956 - 4.24 acre ft  
October 1957, November 1958 - 4.16 acre-ft  
November 1959, November 1961 - 4.11 acre-ft  
November 1962 - 4.09 acre-ft  
November 1963 - 4.05 acre-ft  
November 1964 - 3.98 acre-ft  
November 1965 - 3.85 acre-ft  
November 1966 - 3.85 acre-ft  
November 1967 - 3.77 acre-ft

Maxima--Maximum inflow 48.0 cfs, 5:45 pm, July 25, 1955. Maximum storm inflow volume 0.77 acre-ft, 40.5 acre-ft per sq mi, July 25, 1955

Remarks--Records good.

Storm runoff, March 28 to October 29, 1967

Date	Precipitation (inches)	Inflow		
		Acre-ft	Acre-ft per sq mile	Inches
May 26	1.41	0.03	1.58	0.030
July 7	.50	.01	.53	.010
July 17	.74	.22	11.6	.218
Sept. 8	.46	.14	7.37	.138
Sept. 11	.10	.01	.53	.010
Oct. 6	.10	.01	.53	.010
Total	--	.42	22.14	.416

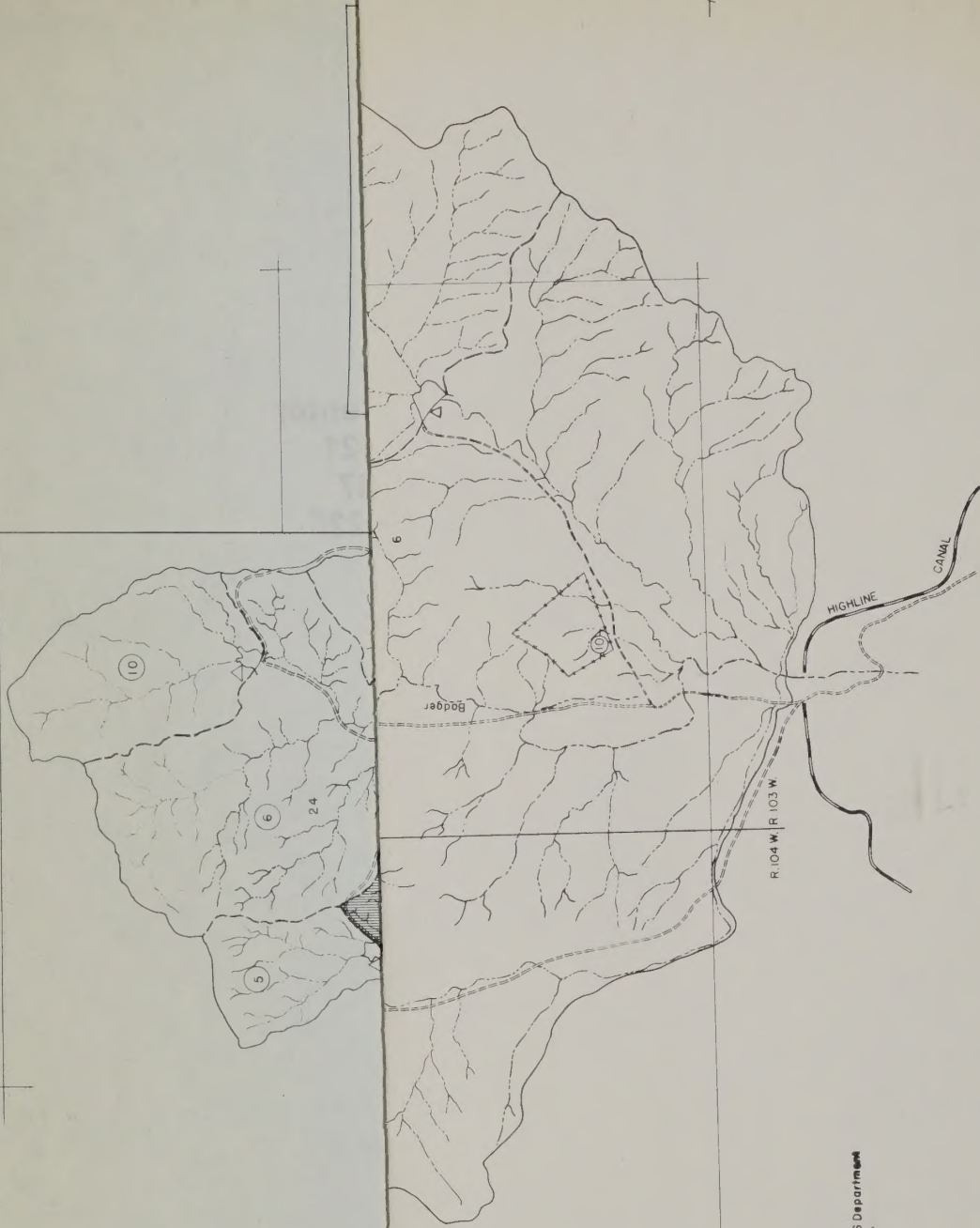




EXPLANATION

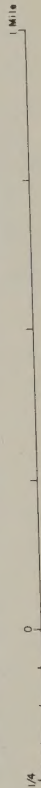
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- ④ Recording rain gage, weighing type
- ▲ Reservoir gage, recording
- △ Reservoir gage, non-recording
- X...-Y Erosion measurement course
- ⑤ Drainage basin number
- ▨ Paired observation area
- Unimproved road

R 104 W R 103 W



Base map prepared by G. C. Lusby from aerial photographs of US Department of Agriculture and land plats of the Department of Interior

MAP OF BADGER WASH COOPERATIVE STUDY AREA, COLORADO, SHOWING HYDROLOGIC NETWORK

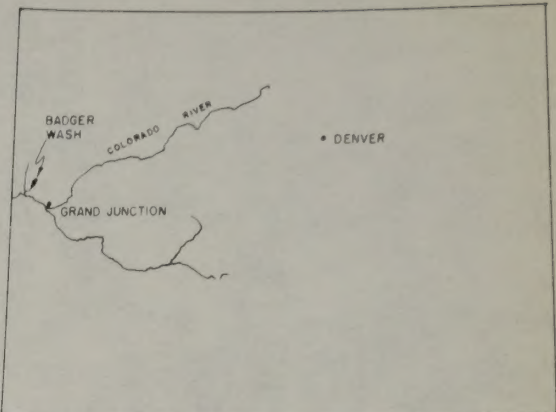
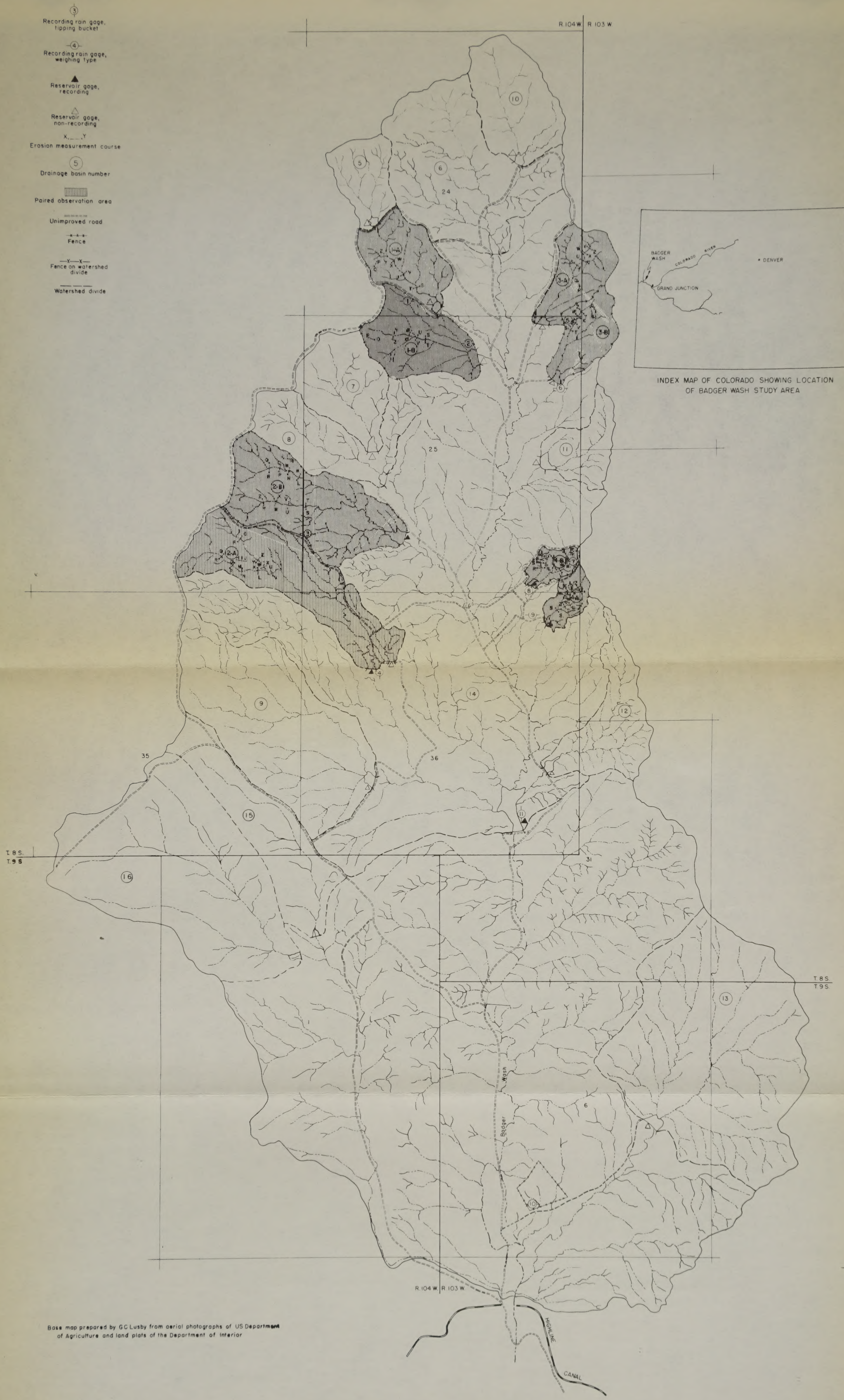






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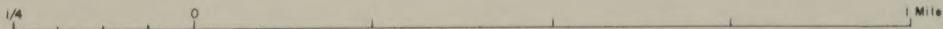
- ③  
Recording rain gage,  
tipping bucket
- ④  
Recording rain gage,  
weighing type
- ▲  
Reservoir gage,  
recording
- △  
Reservoir gage,  
non-recording
- X...Y  
Erosion measurement course
- ⑤  
Drainage basin number
- ▨  
Paired observation area
- — —  
Unimproved road
- +—+—  
Fence
- X—X—  
Fence on watershed  
divide
- — —  
Watershed divide



INDEX MAP OF COLORADO SHOWING LOCATION  
OF BADGER WASH STUDY AREA

Base map prepared by G.C. Lusby from aerial photographs of US Department  
of Agriculture and land plats of the Department of Interior

MAP OF BADGER WASH COOPERATIVE STUDY AREA, COLORADO, SHOWING HYDROLOGIC NETWORK





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